

Handwritten mark



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,475	07/16/2003	Dirk Preikszas	007413-058	7372
21839	7590	04/09/2004	EXAMINER	
BURNS DOANE SWECKER & MATHIS L L P			JOHNSTON, PHILLIP A	
POST OFFICE BOX 1404				
ALEXANDRIA, VA 22313-1404			ART UNIT	PAPER NUMBER
			2881	
DATE MAILED: 04/09/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/619,475	<b>Applicant(s)</b> PREIKSZAS ET AL.	
	<b>Examiner</b> Phillip A Johnston	<b>Art Unit</b> 2881	<i>Am</i>

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3-30-2004</u> . | 6) <input type="checkbox"/> Other: ____.  |

***Detailed Action***

***Claims Rejection – 35 U.S.C. 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4,8-20,24-33, and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Pub. No. 2002/0053638 to Winkler, in view of Takashima, U.S. Patent No. 5,731,586.

Winkler (638) discloses an electron microscope having an objective lens that includes cone shaped pole pieces, focusing upper and lower electrodes, and a working distance beyond a final electrode of less than 2mm. See Paragraph's [0038] and [0039].

Winkler (638) as applied above fails to teach an outer cone angle between 30° and 35° and an inner cone angle between 10° and 14°. However, Takashima (586) discloses an outer cone angle of 30°. See Column 1, line 55-65; and Column 2, line 52-63.

It is also inherent in Figure 3 of Takashima (586), that the inner cone angle is approximately  $14^\circ$ , as recited in Claim 1.

Therefore it would have been obvious to one of ordinary skill in the art that the particle beam objective lens of Winkler (638) can be modified to use the small cone angles of Takashima (586), to provide a high-resolution, magnetic-electrostatic compound objective lens, resulting in an electron beam that is scanned over the sample obliquely to the normal to the sample surface.

Regarding Claims 3,4,8,12,14,17,19,20,24,29-33,37 and 40, Winkler (638), in view of Takashima (586) discloses the claimed invention except for the electrode and pole piece dimensions recited above. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify pole piece and electrode dimensions that will provide electrostatic and magnetic fields to optimize the results of experiments, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

3. Claims 5,21, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winkler (638), in view of Takashima (586) and Frosien (054).

Winkler (638), in view of Takashima (586) as applied above fails to teach a tube electrode extending through an opening in the outer pole shoe. However, Frosien (054) discloses a cylindrical electrode projecting into the lower pole piece. See Column 8, line 8-38.

Therefore it would have been obvious to one of ordinary skill in the art that the particle beam objective lens of Winkler (638) in view of Takashima (586) can be modified to use a projecting cylindrical electrode in accordance with Frosien (054), to provide an electrostatic immersion lens which has first and second electrodes to which voltages are connected so that charged particles are decelerated in the field of the immersion lens to a low energy and has a third electrode to which a variable voltage can be applied to control and accelerate secondary particles, resulting in an objective lens for an electron microscope in which a charge-neutral examination of high resistant specimens can be made.

4. Claims 6,7,22,23,35, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winkler (638), in view of Takashima (586), Frosien (054) and Allen (183).

Winkler (638), in view of Takashima (586) and Frosien (054) as applied above fails to teach a beam tube electrode having a transition from a front face to a sheath section that is rounded in an axial cross section. However, Allen (183) discloses a dome shaped focusing electrode for an electron beam. See Column5, line 50-65.

Therefore it would have been obvious to one of ordinary skill in the art that the particle beam objective lens of Winkler (638) in view of Takashima (586) and Frosien (054) can be modified to use the focusing electrode shape of Allen (183), to control the shape of field lines, thereby defining an aperture through which an electron beam is focused.

5. Claims 41-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winkler (638), in view of Takashima (586) and Takane (914).

The combination of Winkler (638) and Takashima (586) as applied above discloses an electron microscopy system with the objective lens of Claim 1, but fails to teach an electron microscopy system and an ion beam processing system where the ion beam intersects the object surface at an angle deviating from the orthogonal up to about 2°.

However, Takane (914) discloses a scanning electron microscope capable of obtaining three-dimensional information of the line and space sample by a simple technique. However, naturally this embodiment is not limited to it, but can be applied to other charged particle beam apparatuses, for example, a focused ion beam system etc.

FIG. 1 illustrates the variation in the height of an area corresponding to a peak in the edge profile at the time of measurement of a line image with the inclined beam. Note that in the embodiment described bellow, an example wherein the electron beam is inclined with reference to the original optical axis of the electron beam by means of the deflector 304 will be explained. However, the apparatus is not limited to this, and the apparatus may be modified so that the sample to be irradiated by the electron beam is inclined and thereby the electron beam is scanned over the sample obliquely to the normal to the sample surface. In this case, a sample stage having a tilting function may be used or the microscope's lens-barrel itself may be inclined. Further, a

deflector separate from the scanning deflector may be used to incline the electron beam. See Paragraph's [0040] and [0049].

Winkler (638), in view of Takashima (586) and Takane (914) discloses the claimed invention except for irradiating the object surface with a particle beam at an angle deviating from the orthogonal up to about 2°. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the inclination angle of the beam as required, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Therefore it would have been obvious to one of ordinary skill in the art that the electron microscopy apparatus and method of Winkler (638) in view of Takashima (586) can be modified to use an inclined particle beam in accordance with Takane (914), to provide a suitable method for determining a depression/protrusion for the line and space pattern formed on a sample, thereby performing a determination of depressions and protrusions formed on the sample or obtain three-dimensional information.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee

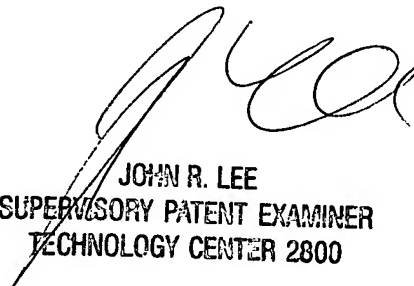
Art Unit: 2881

can be reached at (571) 272-2477. The fax phone numbers are (703) 872-9318 for regular response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ

March 30, 2004



JOHN R. LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800